

**METEOROLOGICAL STATION IN TERRA DEL FUEGO.**

Mr. Moses Y. Ransom, of Cleveland, Ohio, writes that he is about to establish a business plant on the south shore of Terra del Fuego, which will remain there about three years. He has already sent the Weather Bureau some records kept in this locality during the past year, and as the proper interpretation of these records requires some knowledge of the topography and surroundings of this locality we print the following description from Mr. Ransom's notes:

If you will examine the nautical charts of the Strait of Magellan, the waters of Terra del Fuego, and the isthmus to the south, you will see a large area of land and water that has no parallel on this globe, a country beyond 53° south latitude, with a temperature seldom below freezing point and yet never warm. Its high mountains reach up into a frigid temperature, while their bases are continually washed by the warm waters of the Pacific, resulting in an atmosphere that is too damp to dry a cotton cloth in the open air. There are channels of water in every direction, 1 to 3 miles wide, fiords cut perpendicularly down from the summit to the water level, 3,000 to 4,000 feet, and then, below you, there are still from 10 to 300 fathoms of water. All over this section, particularly to the westward, are elevations rising to 4,000 and occasionally to 8,000 feet. There are thirty to fifty great glaciers, and all around below them the beech trees and the tropical magnolias, which are evergreens here. In some places grass grows on decayed grass roots all the year round, and so long has this endured that there is frequently an accumulation of wet, decayed vegetable matter under these roots. You can push a bamboo pole down 16 feet. The tidal rise and fall is 40 feet at the first narrows in Magellan Strait; 60 miles farther in the tide rises from 4 to 6 feet; in the southern channels, practically no tide, but a current, apparently driven by the wind. The albatross, the penguin, the parrot, and the canary bird live here. The barometer falls with a wind from southwest for one day and then rises with a gale from the southwest a few days later; and the same may be said for winds from every other point of the compass. I had my yacht hove to, riding out a heavy gale of wind off Cape Horn Island for four days. On my return to the station, only 60 miles northward, I found that they had had continued good weather on the land and no evidence of a gale 60 miles away from them. I can get no position on the land that the winds are not controlled in direction by the high mountains and valleys. Good observations of the clouds are generally obscured by the masts and rigging above us. I can not take temperature by the wet and dry bulb, for both of them are constantly wet. There are but few days when we can get the true temperature of the ocean; the surf is so tremendous that you can only catch a part of a pint of water high up on the beach.

**RECENT EARTHQUAKES.**

Prof. Edward W. Morley of Adelbert College, Cleveland, Ohio, reports that his seismograph showed no earth tremor during the current month. The same may be said of the Marvin seismograph at the Weather Bureau in Washington.

On November 4 a severe shock of earthquake was reported at 2:29 a. m. over portions of Idaho, Montana, and Utah. The shock was especially severe at Dillon. A second shock was felt, but not so severely, over the same area at 7 a. m.

On Sunday, October 31, about 4 p. m., a mysterious detonation shook the ground at Niles, Mich. It is by no means certain that this was due to an explosion of gunpowder, as at first supposed, or to an earthquake. It frequently happens that noises and vibrations, and the destruction of window glass are produced by the passage of great meteors which are, themselves, hidden by clouds or the bright sunshine, and this may easily have been the case at Niles.

**WEATHER BUREAU STATION ON MOUNT TAMALPAIS.**

In the September number of the MONTHLY WEATHER REVIEW the reader will find the first report of Mr. W. H. Hammon, forecast official at San Francisco, on the results of meteorological observations made during his recent stay on the summit of Mount Tamalpais. His observations and conclusions satisfactorily demonstrated the probable usefulness of that station in weather forecasting, and it was his report only that justified the Chief of Bureau in deciding to recommend to the Secretary of Agriculture that the Bureau incur the expense of a permanent establishment at that point. It was necessary to have this positive report from an experienced

forecast official before the establishment of such a station could be decided upon. In former years Mount Washington, Pikes Peak, and Mitchells Peak were all occupied by the Weather Bureau as mountain stations, hoping thereby to directly increase the accuracy of the forecasts, besides also adding to our knowledge of the phenomena of the upper atmosphere; but in the progress of time exigencies arose that demanded the surrender of these stations, and regrettable as that was from the point of view of the student of meteorology, yet it must be confessed that the daily forecasts did not suffer therefrom. When, therefore, petitions and letters from the citizens of California were received, urging the establishment of the Tamalpais station as a popular desideratum, the first inquiry naturally was, "Will this station be sufficiently advantageous to the forecaster to justify its maintenance?" and that question could only be answered by allowing Mr. Hammon to occupy it for a sufficiently long time. The phenomena that he reported from the summit were the first that the Weather Bureau had received directly bearing on the question of weather predictions for California from local indications of temperature, wind, and sky, as compared with general indications furnished by the barometer and the daily weather map.

It is true there was on hand a report from Prof. George Davidson, the distinguished representative of the Coast and Geodetic Survey, urging the value of the station from a general meteorological point of view and as a lookout for telegraphically announcing passing vessels, which are hidden by the fog within the Golden Gate; but this was not quite the point of view of the Weather Bureau forecast official. Mr. Davidson occupied the Coast Survey station on Tamalpais from December, 1858, to March, 1859, and again from July to September, 1882. In 1883 he urged the establishment of an observatory, and interested Mr. William T. Coleman, of San Francisco, in the project. They secured funds and built a wagon road to the summit of the mountain. The land, the house, and the telegraph line were provided for, when, suddenly, some one opposed the project and frustrated all further efforts. Professor Davidson's report says:

The great obstacle to the free and unrestricted navigation of our coast and of the entrance to San Francisco harbor is the prevalence of fogs. During the months of July, August, and September, 1882, these fogs were extremely persistent from the Golden Gate seaward to and beyond the Farallones. In the neighborhood of Point Reyes there has been as long a period as thirty-nine days of continuous fog.

During the other months there is much fog, and sometimes it is continuous and very dense. From observations directly on Tamalpais, and also from surrounding mountain tops, I have found that this fog cloud attains an average height of 1,400 or 1,500 feet above the sea; but it sometimes rises so high as to envelop the summit of Tamalpais. In all ordinary fogs the observer on the mountain will occasionally see the fog dissipate along the immediate shore line in the greatest heat of the day, and close up again at night. Sometimes he sees the Golden Gate blocked by fog far beyond the Heads, and large areas of the Gulf of the Farallones clear of fog, with vessels here and there that could see nothing but the mountain. At times the southeast Farallone will be covered, and large areas free; so with Point Reyes. Then, again, the Farallones and Point Reyes will be clear, but fog nearly cover the Gulf. My experience clearly indicates that the locality of the maximum fog in the Gulf of the Farallones lies between the Heads and Point Reyes, and this is confirmed by the record for fog signals. The fogs at the Heads are much more frequent than at the southeast Farallone. In 1883 the average monthly record of the fog signal at that island was ninety hours, and one hundred and fifty-four hours at Point Bonita.

In the areas of partially dissipated fog in the Gulf and in the Golden Gate I have seen the mastheads of vessels above the low-lying fog, in which their hulls were invisible; so that a lookout at the masthead could have certainly gotten the direction of Tamalpais. Moreover, a signal officer on the mountain could have known her signals. Of course, there are times when the mountain top is covered with a cloud cap while all below is moderately clear. This condition usually precedes southeast weather and does not arise from fog. Telephonic communication with the city station would cover such infrequent cases.

Throughout the year the broad outlook from Mount Tamalpais will help the signal officer, because he is not hampered by the local and

unfavorable conditions of the city, and because he can see conditions of the atmosphere far to seaward and far along the Sierra Nevada to the southeast and northeast that are unknown to the city station. At the Sierra Nevada geodetic stations the observer can usually predict, from his observations, the weather for two days in advance.

From the station on Tamalpais notices of vessels could be given in clear weather when they are on the horizon 60 miles distant and directly seaward, or far to the southward, or to the northwestward, even beyond and over the lowlands inside of Point Reyes. And even when the vessel is only seen in some small open patch, an observation on her from the station for direction and depression would give an approximate position which could be telegraphed to the city for information or assistance. And in heavy southwest weather the condition of the bar when breaking, or the danger of some vessel could be promptly made known to the city.

This letter and attending reports were sufficient to justify Professor Moore in his determination to give every opportunity for a full investigation of the merits of this station and, if worthy, to give his hearty support to the projected new mountain observatory. Petitions from the citizens of San Francisco in October, 1896, were followed by immediate action by Hon. J. Sterling Morton, then Secretary of Agriculture, who ordered that—

The necessity of instituting the station be given careful consideration, bearing in mind that stations are made for the good of the Weather Bureau service, which is intended to be strictly utilitarian; therefore, neither personal nor political influences are to be considered when new stations are proposed or other innovations suggested.

The investigation made at that time did not suffice to overcome the objections as to expense and the uncertainty as to the possible value to the forecaster of a station on Mount Tamalpais.

On May 20, 1897, Mr. W. H. Hammon, Forecast Official, reopened the question and offered to contribute his own time, viz, his annual vacation leave and a considerable part of the expense if he might be allowed to occupy this station and, by personal experience, determine its desirability. His offer was accepted, the necessary apparatus was secured, and on July 10 Mr. Hammon was assured by the Chief of Bureau that—

It is believed, therefore, that whatever is done in this direction should be well done, and that the instruments and apparatus should be carefully installed with a view to obtaining the best possible results; but it must be distinctly understood that you are to use your own judgment as to the amount of time and work you can expend in connection with this new station, as work of more immediate and pressing importance demands your attention, namely, the inauguration of a more efficient climate and crop service for the State of California. The fact that your numerous requests for increased expenditures and for additional assistance have not been complied with should not be taken as an evidence that the Central Office does not appreciate your work or that it does not wish to honor all reasonable recommendations which you make. The fact is, that during several years past there has been no increase in the appropriation for the support of the Weather Bureau, while the amount of work has vastly increased. This makes it absolutely impossible for the Chief of Bureau to exceed a certain limit of expansion and development.

These conditions are thus made plain, so that you may not misunderstand the attitude of the Central Office, and so that you may be in a position to assist rather than to embarrass the Chief of Bureau.

It is presumed that you have fully considered the amount of work that will be required of your station in connection with the transfer of climate and crop service from Sacramento, and that you still believe you can care for this additional station.

It is desired that you temporarily establish the station on Mount Tamalpais, and after a reasonable time make a definite report as to the value of the observations in assisting you to make better weather forecasts. If it can be shown that the observations are of sufficient importance an increase in our present appropriations will be asked of Congress in order to enable the permanent establishment of the station.

Mr. Hammon occupied the new station during the whole month of September and made two reports, i. e., one on the value of the station, which was published in the September REVIEW, and one on the location of the temporary station, which we publish in the present REVIEW, together with the accompanying chart showing the relation of Tamalpais to the surrounding region.

Mr. Hammon's report on the value of the station was convincing to the Chief of Bureau, who, in congratulating him, said:

I have been very much pleased with your report, which is lucid and valuable. Your investigation has convinced me of the utility of placing an observatory on this promontory and it is regretted that we have not the means to at once take up this work. If the estimated increase in our appropriation is given for the fiscal year beginning July 1, 1898, you can expect to have the station established according to the plan outlined in your report of September 30, 1896, \* \* \* and that one observer be permanently detailed for work at the mountain station and that he be in telegraphic communication with the San Francisco office, and that the mountain station be considered as a part of your own.

Excellent suggestions are often received by the Chief as to probable and possible and hypothetical improvements in the Weather Bureau service, and this present history simply presents one more illustration of the general principle that such suggestions are not sufficient in and of themselves, but the authors must establish the fact that the suggestions are really valuable as increasing the utility of the service.

#### REPORT ON THE LOCATION AND ELEVATION OF INSTRUMENTS AT MOUNT TAMALPAIS, CAL.

By W. H. HAMMON, Forecast Official (dated September 25, 1897).

The region about Mount Tamalpais is shown on the accompanying chart, No. VI. There are three peaks in an east and west line, the extreme eastern one being about 1½ mile from the extreme western one. The eastern peak is 2,592 feet in height; the western one about 2,620, and the middle one, equidistant from the other two, is about 2,500. The saddles between these peaks have elevations of between 2,200 and 2,300 feet. The surface slopes very abruptly from this ridge to less than 1,000 feet within a mile and in almost every direction, the slope being much more abrupt from the eastern peak, the summit of which is but a sharp point, except for a ridge about 100 yards long, extending to the southwestward. From this eastern peak, where the wind vane is established, the surface slopes to an elevation of 100 to 300 feet within 2 miles in every direction, except toward the west, and on that side it drops to the saddle, 250 feet below and about 1,000 feet distant. This peak is, therefore, an isolated cone, rising nearly half a mile above the entire surrounding region, with the exception of the west, where, perhaps, 30° of the horizon are obstructed by the two other peaks. A thermometer shelter may be placed above ground on a knoll, about 20 feet high, to the west of the hotel. For the present, however, a "cotton-region shelter," placed in the shade of the deep veranda on the west side of the hotel, is satisfactory. The tavern of Tamalpais is 800 feet from the flagstaff on the summit of the eastern peak and 240 feet below it. The anemometer is on a support in the place formerly occupied by the flagstaff, but the self-register is kept at the tavern, and a connection is made by a telegraph cable about 1,000 feet long.

The wind vane and anemometer are mounted upon a combined shaft, 18 feet long. This is placed upon the topmost rock of the eastern peak of the mountain. The shaft, being hollow, was set over an iron flagstaff 1½ inch in diameter, which had been previously leaded in the rock, and was cut off about 2 feet above the rock. After setting the shaft over it, cement was run into the hollow shaft, filling the space between them. The guy rods were leaded into holes drilled into the rock. The shaft is perfectly stable and unusually free from vibration. The rock is 2,592 feet above sea level (Coast and Geodetic Survey), thus making the vane 2,610 feet above sea level and the anemometer cups about 1 foot lower.

The surface slopes downward from the point where the shaft is erected at angles varying from 10° to 40°. The vane is apparently free from all disturbing influences, and in brisk to high winds remains almost absolutely free from motion.

The thermometers are mounted in a "cotton-region shelter,"